

FORTHCOMING IN *CLIMATIC CHANGE*

Corporate Promotion and Climate Change: An Analysis of Key Variables Affecting Advertising Spending by Major Oil Corporations, 1986–2015

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Abstract

Advertising by fossil fuel companies is a ubiquitous element of modern political life. Promotional campaigns in the service of a corporation's position toward environmental issues such as climate change are prevalent in the oil and gas sectors, where corporate image is seen as a valuable asset in managing risk, controlling negative media attention, and overcoming resistance by antagonistic civil society groups. This article assesses advertising expenditures by five major oil and gasoline companies for the time period 1986 to 2015. We examine four major factors that may influence spending on advertising by the oil and gas sectors: 1. The overall reputation of the oil and gas sector; 2. Congressional attention to climate change; 3. Media attention to climate change; 4. A series of control variables including major oil spills, the publication of major climate change reports, overall public concern about climate change, GDP, and oil prices. We find that the factors that most influence corporate promotional spending are media coverage and Congressional attention to the issue of climate change.

What's on my to-do list today?

Protecting biodiversity everywhere we work.

Defeating malaria.

Ending energy poverty.

ExxonMobil Advertisement, 2017

Advertising by fossil fuel companies is a dominant strategy to manipulate environmental discourse and influence political outcomes around climate change. A recent television commercial by ExxonMobil extolled the virtuous acts of their employees in their “To Do List”¹ campaign. Similar campaigns include Chevron’s “People Do”² (Porter 1992) and Royal Dutch Shell’s “What If Your Idea Could Change the World?”³ All of the major oil companies engage in extensive promotional campaigns. In a recent analysis, the media watchdog Media Matters for America found that in one week on CNN, advertisements by the fossil fuel industry outweighed climate change news coverage by a factor of nearly 5-1.⁴

These ad campaigns are part of broader efforts by corporations to increase their corporate reputation and overall legitimacy to obtain what is commonly described in the industry as a “social license to operate” (Harvey & Bice 2014). Legitimacy, or “the acceptance on the part of a given audience that a particular actor...is generally seen to be acting properly toward pro-social objectives within an established set of values, norms, and expectations” (Manheim 2011: 22-3) is pursued by corporations to achieve this social license through reputation-management strategies such as corporate social responsibility (CSR) initiatives or “corporate citizenship” programs. Corporations with more favorable reputations maintain a competitive advantage (Fombrun & Shanley 1990; Porter & Kramer 2002) and “are more likely to enjoy greater degrees of trust and loyalty by various stakeholders, including consumers and investors” (Walsh

¹ https://www.youtube.com/watch?v=iqQq984RY_k

² <https://www.youtube.com/watch?v=bReBO55XzZc>

³ <https://www.ispot.tv/ad/AwKw/shell-a-breath-of-fresh-air-featuring-kiki-sukezane>

⁴ <http://mediamatters.org/research/2016/04/25/study-cnn-viewers-see-far-more-fossil-fuel-advertising-climate-change-reporting/209985>

et al. qtd. in Gatzert 2015). This is an especially important factor in the oil sector, which has had a negative public reputation since the beginning of the 20th century. In *The History of the Standard Oil Company* (1904), Ida Tarbell painted a picture of Standard Oil as a greedy and rapacious corporation, willing to despoil the natural environment, and engaged in ruthless competition to maximize profits. To counteract this reputation, fossil fuel companies have attempted to burnish their image in various ways, from employee welfare programs in the early 1900s, through wartime industrial “statesmanship,” and into contemporary multimedia promotional campaigns (Marchand 1998; Beder 2002; Hoggan 2009). The aim of these campaigns is to project the corporation as a positive, responsible and legitimate social actor (Ludlam 1974).

These campaigns have important impacts on the likelihood of climate action. The predominant analysis of public debates over climate change has focused on the promulgation of climate misinformation (Dunlap & McCright 2015). This form of analysis has yielded considerable insight into the efforts to sow doubt about climate science. However, it fails to address the extensive efforts to also promulgate positive information about fossil fuel corporations. By promoting a positive image of fossil fuel companies, these campaigns aim at increasing the public reputation of these corporations, which assists the corporation in managing risk, controlling negative media attention, and overcoming resistance by antagonistic civil society groups, thereby decreasing the likelihood of governmental regulatory action. A positive corporate reputation can serve to decrease public and political demand for climate legislation. Thus a fuller picture of the efforts of fossil fuel corporations to oppose climate legislation involves both the promulgation of climate misinformation and promotional efforts to enhance corporate reputation and legitimacy.

Over the past two decades, an extensive literature has emerged that centers on the rise of promotional techniques to shape political action (Anderegg & Goldsmith 2014; Bennett & Manheim 2001; Greenberg, Knight, & Westersund 2011; Palenchar & Fitzpatrick 2009; Pfau et al. 2007; Walker 2014). Although politics has long been subject to influence by interest groups and other forms of advocacy, the growth and professionalization of influence in the form of advertising, public relations, and public affairs management have had a major impact on political and legislative action. As diverse groups vie for public attention across multiple communication channels, it has become common practice for corporations,

government, and advocacy organizations to employ “information and influence campaigns” (IICs), defined as “systemic, sequential and multifaceted effort[s]” to promote viewpoints that orient the political decision-making process toward their desired outcomes (Manheim 2011:18). These campaigns involve a number of interrelated activities, such as issue advertising campaigns, lobbying, participation in legislative debates (McGarity 2004), efforts to obtain positive media coverage, employment of third-party spokespersons to advocate for desired policies, and grassroots (“astroturf”) mobilization (Stauber & Rampton 2002). In addition, corporations engage in promotional advertising campaigns to enhance their legitimacy and reputation. Yet despite the growing recognition of the role of promotional campaigns in political action around climate change (Beder 2002; Hoggan 2009; Schlichting 2014), there has not been to our knowledge a sustained analysis of oil and gas sector companies’ IICs and their connection to climate change.

To expand the analysis of climate change communications beyond existing misinformation efforts, we seek to initiate research into the use of IICs in climate change politics. While we know that oil companies engage in extensive reputation-building campaigns to enhance their legitimacy, we lack an understanding of the extent of these campaigns, or what factors drive these activities. This article represents an initial effort to conduct an empirical analysis of IICs related to climate change politics. Since this is an early effort, we constrain our analysis to promotional advertising expenditures of major oil companies. Subsequent analyses can expand their purview to encompass the entire range of activities involved in IICs. In the first part of the article, we review the literature regarding the relationship between corporate promotion and political legitimacy, and how these efforts can impact both stakeholder perception and legislative action. In the second section, we provide a brief historical description of the development of fossil fuel corporate promotion efforts. We then turn to an empirical analysis of these efforts, conducting a time series regression analysis of the factors that influence industry promotional spending. We conclude with a discussion of the results and further research needs.

Corporate Promotional Campaigns

The origins of political public relations and the application of advertising techniques to influence public policy originated in the efforts of the press agent Ivy Lee before World War I (Habermas 1989:193-194). Rather than enter into political debates to ascertain the common interest, institutions could use

publicity techniques to intervene in civil society and secure a political and cultural advantage through the manipulation of communications and media. This was accomplished by representing the particular interests of an organization as being in the general public interest. The goal was not to engender critical reflection and debate, but rather to generate goodwill and prestige for a given position, thus strengthening public support for that position (Knight 2010, Magnan 2006:32). The consensus that results is one based on persuasive appeals through the application of advertising techniques (Sievers 2010:136; Walker 2014). It provides a cultural resource in the form of general dispositions that can then be drawn upon to develop support for a specific policy decision (Habermas 1989:201, Calhoun 1993:26).

As media outlets have proliferated, the bases of a common public opinion have fragmented. Greenberg et al (2011: 69) noted: "It can no longer be assumed that there is any unity of reason acting as the point of departure and destination for public discourse. Public discourse is fragmented structurally and culturally as different, incommensurable forms of interest come into competitive play." In this situation, organizations have powerful incentives to engage in activities to set the terms of the debate to favor their preferred policy outcomes. Empirical analyses of advertising campaigns show that they can have a substantial impact on public opinion. Pfau et al. (2007), utilizing a controlled experiment, demonstrated that repeated exposure to carefully crafted messages significantly shifted the test subjects' support for different policy measures. In this "promotional" public sphere, a distinct advantage is maintained by well resourced organizations with sufficient economic, political, or organizational capacities to generate publicity campaigns on behalf of their positions (Greenberg et al. 2011:69) and thus realize a significant advantage in influencing the public agenda and political processes (Cooper and Nownes 2004:564).

Given their potential for competitive advantage, advertising and other forms of professionalized advocacy are used by powerful organizations and community groups alike (Howard 2006; Karpf 2016; Kreiss 2016). Thus it has become common practice for all manner of organizations to engage the services of promotional specialists to impact the political decision-making process to favor their desired outcomes (Mix & Waldo 2015:126, Manheim 2011:172). These advertising campaigns can be seen as strategic political communications efforts that aim to modify perceptions of key actors and the public to accomplish certain goals. The objective is to bring about a shift in the beliefs of the targeted audience. In this sense, these campaigns rely on the promulgation of propaganda (Collison 2003), which Carey (1995:

20) defines as “communications where the form and content is selected with the single-minded purpose of bringing some target audience to adopt attitudes and beliefs chosen in advance by the sponsors of the communications.”

Two promotional strategies in which fossil fuel companies engage are issue advertising and image advertising. Issue advertising (also called advocacy advertising, single-issue advertising, controversy advertising, and legislative issue advertising) is the creation of media messages by an organization to advocate its position on political or social issues (Sethi 1977). They generally are time limited and focus on a specific issue. Because issue advertisements are ads about matters of public policy as opposed to products or candidates, they are not subject to federal campaign finance regulation (Falk, Grizard, and McDonald 2006).⁵ Neither are they bound by any requirement to present a “balanced” or detailed perspective on complex issues. Waltzer (1988) observed that in general, “[corporate advocacy] advertisements present the corporation’s definition of the issue, structure of facts and argument, and preferred policy alternative. The corporation’s view of the problem and its resolution is offered as accurate, valid, and in the public interest. The advertisement may ignore or deny the facts, arguments, interpretations, conclusions, and recommendations of the sponsor’s opponents” (44).

A second form of advertising is image advertising. It is aimed at increasing the legitimacy and reputation of the organization sponsoring the advertising (Tedlow 1979). They are longer term efforts and are not tied to a specific political issue. Image advertising highlights the importance of the “intangible” elements of the firm in addition to tangible ones. Corporate image and identity construction are believed to build and maintain trust and loyalty, not only among “external” audiences such as consumers but also among internal audiences like employees. Image advertising is a key part of building a company’s reputation. It builds the firm’s attractiveness and serves as a source of competitive advantage for the firm.

Image advertising is understood to be part of a company’s “social responsibility.” Attention to the “triple bottom line” (financial, social, environmental) performance is meant to show companies’ interest in and commitment to activities beyond the economic. Whereas “Milton Friedman famously described the

⁵ Issue advertising is also sometimes referred to as marketplace advocacy, in reference to the idea that unlike product/service advertising and image advertising, issue advertising represents an effort to “protect the company’s market by influencing a legislative outcome or a policy debate” (Gaither & Gaither 2016; Miller & Lellis 2016).

social responsibility of business to maximize shareholder wealth” (Pomering & Johnson 2009: 107), today’s businesses conceptualize social responsibility in terms of broad social obligation beyond shareholder benefits, and environmental commitments to offset polluting behaviors. Frandsen et al. (2011) argue that organizations actively try to shape the external field of organizational relationships through their communications efforts. To establish legitimacy in this larger field, companies attempt to promote themselves as representing norms of rationality, progress, and appropriate conduct. This includes efforts to manage overall industry sector reputation (Barnett & Hoffman 2008). Indeed, promotional campaigns in the service of a corporation’s social responsibility are prevalent in the oil sector, where corporate reputation is seen as a valuable asset in managing risk, whether the everyday risks of day to day operations or the broader risks of fluctuating shareholder value.

Major Oil Company Promotional Efforts

Corporate reputation has long been understood to be a valuable asset for oil companies in “buffering negative critical incidents” (Tischer & Hildebrandt 2014) such as oil spills, overcoming resistance by antagonistic civil society groups, and differentiating a company’s position from that of others in the sector (Frynas 2010). As Bortree (2009) shows, green initiatives are one form of corporate legitimacy seeking. In general, corporations with poorer environmental records spend more on promotional campaigns to gloss over their poor performance (Cho, Patten & Roberts 2006).

Between WWII and the mid-1960s, extractive industries held considerable influence over the nature and dissemination of scientific research around environmental issues (Conley 2006). Starting in the 1970s, however, in the wake of increased awareness of environmental damage and the rise of the public interest movement, corporations faced tighter government regulation and increased scrutiny by a growing set of opposing groups, including environmentalists (Vogel 1989). The role of big business and free enterprise in the United States at this time was less clear, and more contentious, than it had been since prior to WWII. Feeling “squeezed out of the public communications space by more vocal activists” (Kerr 2005) and especially that media treatment was unfair and underinformed, corporate leaders turned to new forms of advertising as part of a broader public relations and public affairs effort to influence targeted audiences and policy (Aronczyk 2018; Vogel 1989).

The development of post-WWII corporate promotional activities in the oil industry was arguably led by Mobil Oil. Mobil was a key actor in the legal struggle to create a free speech right for corporations, which culminated in the Supreme Court decision in *First National Bank of Boston v. Bellotti* in 1978 (Kerr 2005). It also developed an aggressive public relations campaign. In 1970, Mobil began buying space on the Op-Ed page of the *New York Times* (Kerr 2004; Schmertz 1977; Brown & Waltzer 2005; see also St John III 2014b). Between 1970, when the *New York Times* first launched its op-ed page, and 1988, Mobil Oil used this space nearly every Thursday to promote its corporate citizenship and express views on public policy. Its overarching viewpoint was to emphasize the need for growth in oil use (energy) and the economy. In its evaluation of its public relations program (Mobil 1982), Mobil claims that their Op-Ed effort shifted the editorial stance of the paper: “the *Times* has altered or significantly softened its viewpoint to positions similar to Mobil’s on at least seven key energy issues” (Mobil 1982: II-B-1).

This advertorial campaign was hardly the only way Mobil advanced its public policy position, even in the 1970s. Between 1975 and 1977 alone, Mobil representatives appeared on 365 TV shows, 211 radio shows, and gave 80 newspaper interviews.⁶ The company also supported speakers’ programs, wrote bylined articles, and recorded “electronic news releases” (a precursor to the now-ubiquitous video news releases or VNRs) to distribute nationally to radio stations. They sponsored sports events as well (Schmertz 1988).

One reason Mobil initially focused on print sources for its issue advertising in the 1970s was that the three major news networks of the era (ABC, NBC, CBS) did not allow controversial issue advertising. To overcome this problem and gain the attention of TV viewers, Mobil began to underwrite programs on public television, notably the British television programs *Upstairs, Downstairs*, and *Masterpiece Theater*. “Because of its interest in single-topic programs, public television became the best place for a company to shape a policy message without its being cluttered by other advertisers. Instead of creating a noncommercial alternative to network television, public television had created a link between underwriters and their series” (Ledbetter 1997: 154). The strategy behind this approach was to improve corporate image by association with cultural excellence (St John III 2014a). In assessing the impact of these programs, Mobil Oil Company saw them as highly successful: “Our Op-Ed program and our support for

⁶ 1977_Schmertz_Mobil Oil_Speech_PRSA171-5.pdf

“Masterpiece Theatre,” in particular, have enabled the company to become part of the “collective unconscious” of the nation, as the changed views of opinion leaders have gradually molded general public opinion (Mobil 1982: II-A-1).”

Along with Mobil Oil, other oil companies expanded their corporate image campaigns in the wake of the energy crisis. In the late 1970s, Shell initiated a public relations program centered on the theme “Come to Shell for Answers.” The idea of this campaign was to establish a partnership with the auto-driving public as a willing partner to assist in meeting the consumer’s needs. This was based on the premise “that the company that is no stranger to the public can be no enemy” (Shell Oil 1978: 59). Later campaigns included “People Do” by Chevron (Porter 1992), “Beyond Petroleum” by British Petroleum (Driessen 2003), and “Energy Solutions” by Exxon-Mobil (Plec and Pettenger 2012). All of the major oil companies now have large-scale corporate promotion campaigns.

As global climate change has risen as an issue, corporations have turned to a number of strategies, including funding the promulgation of scientific misinformation (Supran & Oreskes 2017), lobbying, and other political activities either on their own or through their trade associations. Additionally, corporate promotion campaigns have focused on presenting corporations as responsible corporate citizens, taking appropriate action to address climate change. As a potential major influence on the operations of fossil fuel companies, responding to climate change should be a significant factor in the focus and levels of effort invested in corporate promotion activities. However, there is a dearth of analyses of either the impacts or drivers of corporate promotional activities. To address this issue, we turn to an analysis of corporate promotion spending.

Analysis of Promotional Spending

To expand our understanding of the drivers and impacts of corporate promotion spending, we focus on the five major fossil fuel companies in the U.S.: ExxonMobil, Shell, ChevronTexaco, British Petroleum, and ConocoPhillips. As discussed above, corporate promotion activities span a wide range of activities including issuing press releases, influencing media coverage, sponsorship of events and shows, in-house media/event monitoring, and running corporate promotion advertising campaigns. Many of these activities are not measurable in terms of expenditures, as these data are not made public by industrial actors. However, one publicly available expenditure measure exists that is comparable across these

different corporations – advertising spending. Kantar Media has collected advertising expenditures in a wide array of categories for virtually all of the commercial purchases of advertising space for over 40 years. One category of data that has been continuously collected is advertising spending on Corporate Promotion. This category is *separate* from any issue advertising spending or product advertisement spending. Thus it provides a valid empirical measure of one key aspect of corporate promotion campaign spending. In this analysis, we utilize this data as a proxy measure of the overall level of corporate promotional efforts.

Utilizing the Kantar Media database, we created a time-series dataset that includes advertising expenditure figures for five major oil and gasoline companies between 1986 to 2015 (see **Figure One**).⁷ Throughout the time period of 1986 to 2015, corporate promotional spending for the five major oil companies in the U.S. averaged \$120 million per year.

Figure One Here

However, an examination of this figure shows three distinct periods with significant spending level differences in each period. Corporate advertising expenditures were relatively low through the end of 1996, with an average of \$35 million spent annually. Beginning in 1997 and continuing through 2004, average annual spending increased markedly to an average of \$102 million per year. Finally, Figure 1 shows that expenditure averages jumped again between 2008 and 2016, to an average of \$217 million per year.

What Drives Promotional Spending

To further examine the factors that drive these shifts in expenditure, data was compiled on four major factors that prior scholarship suggests might influence major oil company promotional expenditures.

- 1) *Congressional Attention to Climate Change*: The first potential determinant of shifts in corporate promotional expenditures we evaluated was the extent of political attention to climate change by

⁷ Data obtained from Kantar Media Ad\$ponder data base for the time period 1995 to 2015. Data from 1986 to 1994 obtained from the predecessor publication to the Kantar Media database, *The Advertising Red Books*. Only corporate promotion spending was counted. Figure represents this data, adjusted for inflation in constant 2015 dollars. Totals for corporations include previously separate corporations. See Table S-1 in Supplemental Material for data compilation.

members of the U.S. Congress. Since low levels of corporate reputation are related to an increased possibility of both increased regulatory scrutiny and regulatory reform to pressure perceived “bad” actors to modify their practices, we hypothesized that corporations would have an incentive to increase their promotional expenditures when regulatory or legislative action around climate change is pending. To measure this variable, we collected data on levels of Congressional attention to climate change based on the number of hearings, bills, treaties, or legislation related to climate change considered by Congress in each of the years in our series.

- 2) *Corporate Reputation*: The second factor that may influence corporate promotional spending is the overall reputation of the corporation. Since corporations use promotional campaigns to maintain or increase their overall public reputation, we expect spending to be dependent on overall corporate reputation. Smith, Smith & Dunbar (2014) show that corporate image advertising increases when the image of the corporation is low and decreases when it is high. Since data on individual corporate reputations is not publicly available, we assessed the overall reputation of the oil and gas industry by compiling data from *Fortune Magazine*’s annual Corporate Reputation Index for the petroleum sector and from public opinion metrics derived from the survey Public Confidence in Oil and Gas industry (PCO&G).⁸
- 3) *Media attention to climate change*: Shifts in media attention to climate-related issues could also influence corporate promotional spending. As media coverage of an environmental issue increases, the potentially impacted industries will likely seek to mitigate adverse press by increasing advertising expenditures (Schumann, Hathcote and West 1991). Thus, we would expect increased climate-related coverage in the media to lead to increased corporate spending on promotional campaigns. Media attention to the issue of climate change was measured utilizing counts of news articles on climate change in the *New York Times* and on broadcast news.
- 4) *Public Concern over Climate Change*: Finally, shifts in public concern about climate change could be related to promotional spending by major oil companies. To gauge the influence of shifts in overall

⁸ See Supplemental Material for full description of the construction of this scale.

public concern on the issue of climate change, we use the annual Climate Change Threat Index (CCTI) developed by Robert Brulle and his colleagues (Brulle, Carmichael, & Jenkins 2012).⁹ Our statistical analyses also consider other potentially important (albeit, less theoretically interesting) factors that might influence corporate promotional spending. These include: (a) the number of major oil spills in the U.S.; (b) years in which major climate change reports (IPCC and NRC) were issued, (c) Gross Domestic Product (GDP), and (d) Oil Prices. In each case, we expect that these factors would significantly impact oil companies' promotional expenditures.

Analysis

While our series includes the most extensive data currently available on corporate promotional expenditures by Major oil corporations (1986-2015), our analytical options are constrained by the fact that our analysis will be limited to just 30 cases (i.e. 30 years of annual data). This means that advanced statistical techniques (e.g. structural equation modeling or vector autoregression techniques) that might otherwise be well-suited for estimating shifts in corporate spending on PR, are not likely to produce reliable point estimates given such a small sample size. To estimate our model, we utilize a standard, least squares, time-series regression technique that has been shown to produce accurate estimates when sample size is small. But even this technique requires that we limit the number of explanatory variables in the models (see Austin & Steyerberg 2015 for a broader discussion).

Another common problem that scholars confront when estimating time series data has to do with trending. Most time-series estimation techniques assume that the data is stationary (i.e. mean, variance, autocorrelation are constant over time) because analyses of non-stationary data tends to “underestimate standard errors and thus overstate ‘t’ values” (Johnston and DiNardo 1997: 260). Non-stationary or stochastic trends in time-series data is very common. Tests for non-stationarity (i.e. the Dickey-Fuller Test for unit root) show that all non-transformed variables in our models except for the dummy variable identifying the release of major climate reports contain stochastic trends. To remove these trends in the series, we employ the most common statistical correction which is to first-difference the variables (i.e.

⁹ See Supplemental Material for full description of the construction of this scale.

transform the variables into a series of change scores from one period to the next). Statistical tests of the first-differenced variables suggest that all stochastic trending was removed after the transformation. Detrending the series ensures that the point estimates we present below are reliable.

Several other statistical issues were also considered to ensure the most reliable results. First, causal order between our explanatory variables and the outcome are derived from theory and prior empirical work but to ensure that changes in the explanatory variable precede changes in our outcome measure, we lag most independent variables in our models by one year (i.e. values of an IV in Time 1 are used to predict shifts in the value of the DV in Time 2). Two variables in our models, however, are more clearly exogenous to spending and, as such, do not require such a lag structure. If PR expenditures are employed by Big Oil to respond to major oil spills or the release of major climate reports, then this is likely to happen in the same year as such events. We assume all other independent variables require a lag given that opinion and reputational signals take a year to both gauge and develop a desirable PR strategy.

A second statistical issue we consider is the presence of first-order autocorrelation. Statistical tests suggest (Durbin Watson Statistic = 2.08) that including an autoregressive term (AR1) is unnecessary. Third, multicollinearity between our explanatory variables was assessed. Results from the Variance Inflation Factor test suggest that media related to climate change as well as political attention to the issue are highly correlated. This precludes us from including both variables in the same equation because doing so will produce unreliable estimates. We overcome this problem by alternating the variables in two separate equations. We also assess the explanatory power of an additive index that combines the two factors into a single variable. It is also important to note that corrections for both non-stationarity (first-differencing) and lagging to impose a causal order each drop the sample size by one case, so all of models presented below are estimated with 28 cases. Finally, we present robust standard errors (White's Correction) in all of our models to ensure that unspecified heterogeneity is not influences our findings. Doing so further ensures that the results we present are not statistical anomalies.

Results

Table 1 shows the means, standard deviations, ranges and expected signs for all the variables in our analyses. The data shows that a great deal of variation exists across nearly all of our variables (line

graphs of all the important variables in our models are presented in the supplemental material – Figure S3). Most importantly, we see that our outcome measure has varied widely, from a low of less than \$20 million in 1987 to a high of \$314 million in 2010. We also see the vast shifts in media coverage of climate change as it's ranged from a low of 41 reports in a single year (1986) to a high of 1,241 in 2007 as well as sizable shifts in political attention and the aggregate volume of oil spills. The multivariate results presented below will provide insights into how such variation in these explanatory variables might influence corporate promotional expenditures by major fossil fuel corporations.

Table 1 About Here

Table 2 presents the results from our time-series regression models predicting corporate promotional expenditures between 1986 and 2015. The model sequence presented in the table is designed to avoid the sizable multicollinearity that exists between political attention to climate change and media coverage of the issue. Model 1 presents findings from an equation that tests an additive index of the two variables which we call “Elite Cues”. The second and third models introduce each of the two correlated variables, separately. We see from the results that only a few of the variables we consider in our models have a statistically significant influence on corporate promotional expenditures. As expected, the most powerful and consistent determinants of corporate promotional spending by major oil corporations are Congressional activity on climate change and media coverage of the issue. Importantly, despite expectation to the contrary, neither the release of major climate change reports like the IPCC, nor shifts in public concern about climate change appear to have a significant influence on major oil corporation promotional spending. The control for economic growth (GDP) was significant in two of the three models and oil spill volume was significantly related to PR expenditures by Big Oil in just one model.

Table 2 About Here

Together, these findings support claims that corporations will use favorable promotional campaigns as a tool to avoid the potential of additional regulatory scrutiny. Based on our findings, nothing motivates corporate spending on corporate promotion more than media coverage on climate change and Congressional action on climate change. It appears that major oil corporations may be concerned with the potentially negative influence that increased media coverage of climate change might have on their

overall reputation or how such coverage may influence Congressional action on climate change. To avert such possibilities, corporate executives at major oil companies appear compelled to increase corporate promotion expenditures.

Equally interesting is what does *not* drive corporate promotional expenditures. It is seemingly unexpected that the release of major climate change reports does not increase corporate promotion expenditures by major oil companies. While counterintuitive, it is possible that the lack of response to these major reports is due to their limited role in influencing public opinion related to climate change (similar findings were reported in Carmichael and Brulle 2017, Carmichael et al. 2017, Brulle et al. 2012). It is also plausible that major oil companies are reluctant to directly challenge climate science immediately after the release of a climate reports because the climate science is so incontrovertible. Finally, shifts in public opinion on climate change do not appear to influence corporate promotion expenditures by major oil companies. This is rather important as it suggests that corporate executives are less concerned with public mood on climate change and focused almost exclusively on shaping the public debate by responding to negative media coverage and by using corporate promotion efforts to influence policy makers in Congress.

Additional Considerations: Beyond what we present in Table 2, we also considered alternative specifications of our existing variables as well as additional explanatory factors that might influence the outcome (not shown but available from the authors). First, we assessed the possibility that shifts in a more direct measure of revenue within the sector (Oil prices) might have a significant influence on promotional expenditures. Results were not substantively altered when such a measure was introduced into our models. Finally, we also considered the potential influence of public confidence in the oil industry. Data on public confidence is not available for our entire series, but we did assess the explanatory power of this measure for the available years and found it did not influence the outcome or our original findings.

Discussion and Conclusion

This analysis has some important limitations. First, any measure of corporate advertising spending is necessarily limited. In the United States, scholars lack access to private company data. A potential proxy research method could be to rely on company data from other countries where it is more freely available. Additionally, corporate promotion activities are integrated into a series of actions, only

one of which is corporate promotion advertising. This analysis is based on the assumption that corporate promotion spending is a reliable proxy for the total corporate promotion spending. This is certainly the lower bound of spending on this activity. Third, in the current digital media context, advertising has taken on multiple dimensions. The typical gatekeeper function of legacy media has given way to a far more fragmented public sphere and an unprecedented number of options and platforms to promote particular viewpoints on public policy. Accounts of media spending by corporations are therefore not always representative of total spending levels. Any future analyses will need to focus on the development of additional empirical measures to account for these relationships. Fourth, the measure of the corporate reputation of the oil and gas industry is limited and incomplete. A more robust measure of both the oil and gas sector's and individual corporate reputations would greatly enhance this analysis. Fifth, the content of these campaigns remains unexamined. A content analysis of these campaigns could greatly add to our understanding of how promotional campaign efforts are structured over time.

With these limitations, the empirical analysis strongly supports the existing literature's analysis of the function and drivers of corporate promotion efforts. The data clearly indicates that the level of promotional effort by major oil companies directly corresponds to levels of Congressional action and media coverage related to climate change. As the perceived level of threat of legislative or regulatory action increases, or increased adverse media coverage, major oil companies will expand their efforts to improve their corporate reputation. This effort aims at increasing the perceived legitimacy of these corporations, and in the process, decrease the possibility of regulations or legislation that would change its business operating procedures.

Corporate promotional advertising efforts by the major oil corporations is a big business. Since 1986, these five oil corporations have spent nearly \$3.6 billion in advertising purchases for corporate promotion. The bulk of this spending (61%) occurred from 2006 to the present, which corresponds to the increased public and Congressional attention to climate change in recent years. Not unexpected, the major oil companies spent \$315 million in 2010 alone, which is when the highest possibility of binding climate legislation occurred. This high level of corporate promotional spending took place in response to the legislative battle from 2009 to 2010 over the House of Representatives passage of the Waxman-Markey Climate bill (American Clean Energy and Security Act of 2009) and the subsequent Senate

consideration of the Kerry-Lieberman climate legislation (American Power Act) (McGarity 2014). It should be noted that this is a conservative estimate of the total level of expenditures on this activity.

The analysis of intentional barriers to climate change action has concentrated on the promulgation of climate misinformation. This article adds an additional dimension to prior analyses. The intentional promulgation of what essentially amounts to fossil fuel corporate propaganda by these corporations can have a major impact on the perceptions of the public and major stakeholders regarding the need for legislative action to address climate change. As Mobil Corporation admitted in its analyses of its own promotional efforts, they have been able to shift the editorial stance of the *New York Times* to favor their desired positions on energy issues (Schmertz 1986; Supran and Oreskes 2017). More insidiously, Mobil claims to have embedded favorable perceptions of their corporation into the “**collective unconscious**” of the public. Sophisticated propaganda campaigns designed to manipulate public and elite perceptions of the major oil companies are a significant barrier to meaningful climate action. Climate action proponents need to recognize and address this factor to achieve success.

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Table 1: Means, Standard Deviations, and Predicted Signs (n=30)

Variable	Predicted Direction	Mean	SD	Min	Max
Big Oil Promotional Expenditure (in millions of \$US)	NA	119.91	90.08	19.54	314.62
Big Oil Corporate Reputation Index	-	6.54	.50	5.75	8.19
CCTI	+	42.00	4.06	33.69	49.34
Media Coverage of CC Index	+	352.47	268.93	41.00	1,241
Political Attention to CC Index	+	85.47	82.19	8	337
Major CC Reports	+	.27	.45	0	1
Oil Spill Volume (/10,000 gallons)	+	939.22	3,758.60	19.62	20,771.28
Gross Domestic Product	+	10,708	4,207.19	4,579.6	18,219.3

Table 2: Time Series regression estimates of the determinants of Big Oil Promotional Expenditures (in millions of US \$), 1986-2015.¹

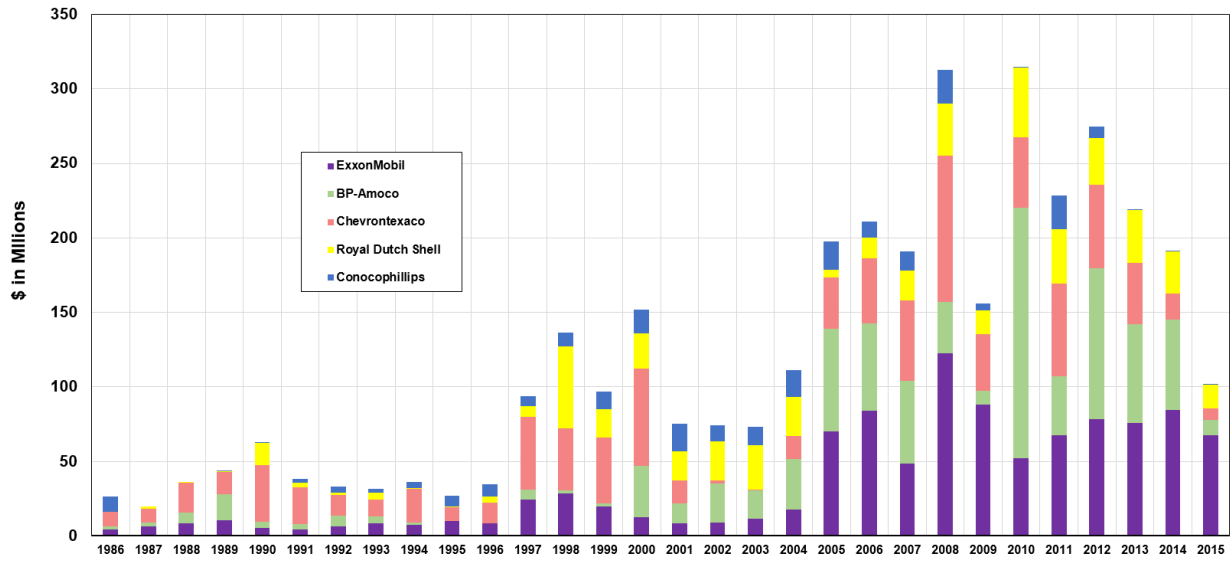
Predictors	Model 1	Model 2	Model 3
CCTI (t-1)	-6.582 (3.199)	-5.436 (3.008)	-5.945 (3.148)
Elite Cues Index (t-1)	.158** (.046)	-----	-----
Media Coverage of CC Index (t-1)	-----	.153* (.069)	-----
Political Attention to CC Index (t-1)	-----	-----	.678*** (.140)
Major CC Reports	11.224 (19.143)	5.799 (20.061)	-7.111 (15.294)
Corporate Reputation Index (t-1)	-23.025 (15.517)	-16.157 (16.851)	-35.029 (19.320)
Oil Spill Volume / 10,000 Gallons	.005** (.001)	.006 (.001)	.001 (.001)
GDP	.092* (.041)	.090 (.048)	.115** (.04)
Constant	-44.035* (16.931)	-42.499 (21.761)	-53.028 (18.825)
Number of Cases (years)	28	28	28
R²	.620	.549	.714

¹ All variables in the equations are first-differenced and all explanatory variables except oil spills, major climate reports, and GDP are lagged by one year (denoted by t-1).

Significance (two-tailed tests): * $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.

Robust Standard Errors are in parentheses below the unstandardized coefficients.

Major U.S. Oil & Gas Companies Corporate Promotion Advertising Spending 1986 - 2015



Notes: Based on Kantar Media AdSpender data base search 5/27/2016
Corporate advertising figures based on "Corporate Promotion" spending only.
Dollar values adjusted for inflation - shown in constant 2015 values.

Supplemental Material

Table S-I: Major Oil Company Promotional Spending 1986 – 2015

Year	ExxonMobil	BP-Amoco	Chevrontexaco	Royal Dutch Shell	Conocophillips	Total 5 Major Oil Companies
1986	\$4,209,840	\$2,270,160	\$9,482,400	\$32,400	\$10,186,560	\$26,181,360
1987	\$6,209,390	\$2,493,370	\$9,718,500	\$1,116,060	\$0	\$19,537,320
1988	\$8,536,000	\$6,952,000	\$20,004,000	\$320,000	\$0	\$35,812,000
1989	\$10,722,740	\$17,321,790	\$14,961,030	\$129,880	\$3,820	\$43,139,260
1990	\$5,473,440	\$4,058,020	\$37,850,720	\$14,769,600	\$975,590	\$63,127,370
1991	\$4,210,800	\$3,690,540	\$24,828,060	\$2,966,700	\$2,613,480	\$38,309,580
1992	\$6,154,980	\$7,410,650	\$13,650,130	\$1,564,940	\$4,128,670	\$32,909,370
1993	\$8,275,440	\$4,552,640	\$11,665,320	\$4,592,000	\$2,300,920	\$31,386,320
1994	\$7,513,600	\$1,190,400	\$22,632,000	\$942,400	\$3,979,200	\$36,257,600
1995	\$9,947,123	\$139,036	\$9,228,927	\$432,348	\$7,398,445	\$27,145,879
1996	\$8,387,462	\$124,320	\$13,978,399	\$3,917,523	\$8,420,393	\$34,828,097
1997	\$24,512,703	\$6,334,860	\$49,124,520	\$6,885,524	\$6,866,027	\$93,723,634
1998	\$28,362,209	\$2,300,291	\$41,555,523	\$54,950,000	\$9,291,570	\$136,459,593
1999	\$19,473,684	\$2,152,347	\$44,609,957	\$18,811,522	\$11,776,245	\$96,823,755
2000	\$12,419,257	\$34,597,662	\$65,277,304	\$23,622,558	\$15,858,322	\$151,775,103
2001	\$8,562,651	\$13,434,940	\$15,153,146	\$19,409,505	\$18,836,011	\$75,396,252
2002	\$9,028,458	\$26,368,775	\$2,035,837	\$25,747,826	\$11,013,439	\$74,194,335
2003	\$11,652,448	\$18,726,031	\$506,572	\$29,914,948	\$12,149,485	\$72,949,485
2004	\$17,482,183	\$33,883,061	\$15,855,834	\$26,061,355	\$17,850,188	\$111,132,622
2005	\$69,883,981	\$69,183,374	\$34,330,218	\$5,287,621	\$18,723,058	\$197,408,252
2006	\$84,056,287	\$58,473,325	\$43,613,631	\$14,195,417	\$10,818,684	\$211,157,344
2007	\$48,457,257	\$55,547,771	\$53,836,800	\$20,213,943	\$12,709,143	\$190,764,914
2008	\$122,753,855	\$34,465,088	\$97,683,921	\$35,338,326	\$22,275,661	\$312,516,850
2009	\$87,886,409	\$9,680,110	\$37,765,304	\$15,801,547	\$4,609,282	\$155,742,652
2010	\$51,871,630	\$168,296,739	\$47,072,500	\$47,135,543	\$239,565	\$314,615,978
2011	\$67,330,980	\$40,025,922	\$62,066,807	\$36,219,916	\$22,901,475	\$228,545,100
2012	\$78,437,461	\$101,330,960	\$55,601,135	\$31,342,724	\$7,915,893	\$274,628,173
2013	\$75,918,210	\$65,936,317	\$41,334,385	\$35,400,102	\$181,587	\$218,770,600
2014	\$84,452,753	\$60,891,992	\$17,266,066	\$28,034,334	\$23,724	\$190,668,869
2015	\$67,513,200	\$10,537,900	\$7,601,100	\$15,656,400	\$162,000	\$101,470,600

Note: All data in Constant 2015 Dollars

Climate Change Threat Index (CCTI) Calculation

For a complete description of the methodology utilized to calculate the CCTI PCO&G scales, see

Huxster, Joanna K. Jason T. Carmichael., and Robert J. Brulle. 2015. A Macro Political Examination of the Partisan and Ideological Divide in Aggregate Public Concern over Climate Change in the U.S. between 2001 and 2013. *Environmental Management and Sustainable Development* 4(1)

Figure S-1: Climate Change Treat Index 1986 – 2015

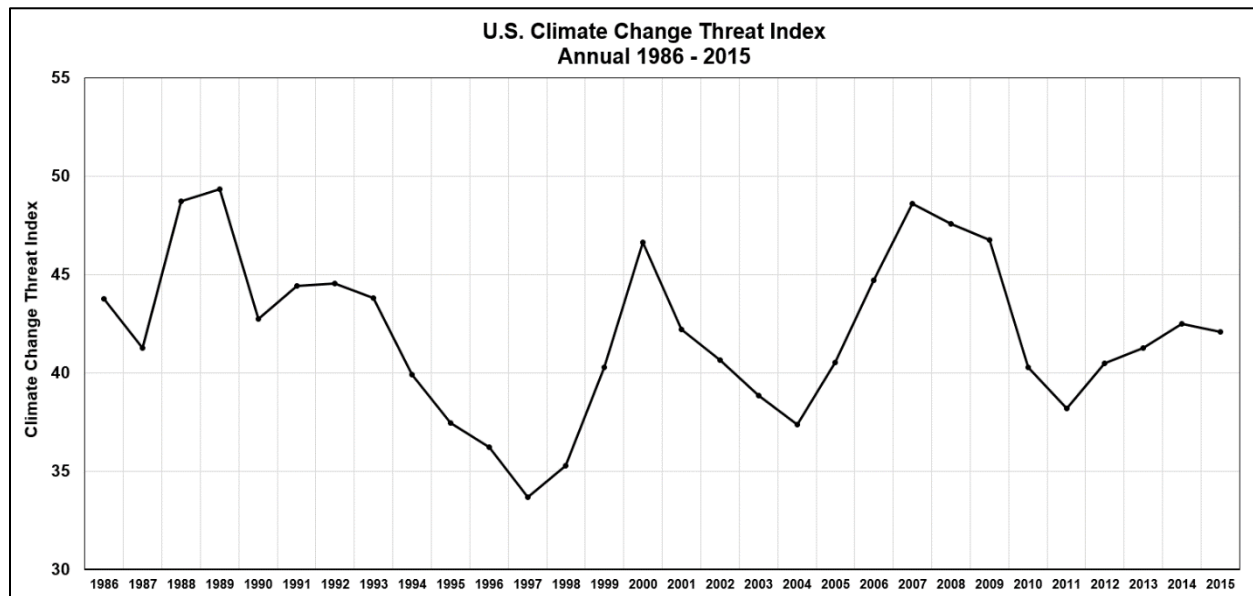


Table S-2: Climate Change Treat Index

Year	CCTI
1986	43.772
1987	41.28
1988	48.742
1989	49.338
1990	42.758
1991	44.402
1992	44.563
1993	43.82
1994	39.921
1995	37.442

Year	CCTI
1996	36.202
1997	33.687
1998	35.262
1999	40.267
2000	46.618
2001	42.212
2002	40.668
2003	38.83
2004	37.36
2005	40.539

Year	CCTI
2006	44.726
2007	48.602
2008	47.588
2009	46.76
2010	40.284
2011	38.194
2012	40.47
2013	41.261
2014	42.48
2015	42.084

Table S-3 CCTI Questions

Question Number	Question	Source
Q11	I'm going to list a few environmental issues. Please tell me what you think is appropriate for each one: urgent government action no matter what the cost, prompt government action, limited government action, or no government action.... Global warming known as the greenhouse effect	Associated Press/Media General Poll
Q12	I'm going to read you a list of environmental problems. As I read each one, please tell me if you personally worry about this problem a great deal, a fair amount, only a little, or not at all. First, how much do you personally worry about...the 'greenhouse effect' or global warming?	Gallup Poll (AIPO)
Q13	Is the following something that you worry about a lot, is this something you worry about somewhat or is this something you do not worry about?...Global warming	Public Agenda Confidence in US Foreign Policy Index Poll
Q15	Now I am going to read you a list of potential threats to the overall quality of the environment. Please use the same card with a scale from 1 to 7, where 1 means no threat at all, and 7 means a large threat to tell me how much you think each problem threatens the overall quality of the environment. The more you think the problem threatens overall environmental quality, the higher the number you would give it....The greenhouse effect	Cambridge Reports National Omnibus Survey
Q16	Now, I'm going to read you some of the arguments people make supporting the requiring of the development and widespread use of alternatives to gasoline and diesel fuels. On a scale from 1 to 7, where 1 means has no effect on my opinion and 7 means makes me much more inclined to support alternative fuels, please tell how each statement affects your opinion about requiring the development and widespread use of alternatives to gasoline and diesel fuels. The more inclined a statement makes you to support the development and widespread use of alternative fuels, the higher the number you would give....Continuing the use of oil-based vehicle fuels will speed up the 'greenhouse effect', causing a dangerous warming of the earth's atmosphere.	Cambridge Reports National Omnibus Survey
Q17AB	If nothing is done to reduce global warming in the future, how do you think it will hurt you personally- a great deal, a lot, a moderate amount, a little or not at all?	ABC News/Washington Post/Stanford University Poll
Q18	Actually, the greenhouse effect--which is a gradual warming of the earth's atmosphere--is believed to be caused by carbon dioxide and other gases accumulating in the atmosphere and preventing heat from the earth's surface from escaping into space. Some people have expressed concern that the greenhouse effect could lead to harmful changes in ocean levels and weather patterns. Just from this information, do you feel the greenhouse effect is a very serious problem, a somewhat serious problem, not too serious a problem, or not a serious problem at all?	Cambridge Reports National Omnibus Survey
Q2	And in the next 10 years, how likely are you to be personally affected by the following threat?...Very likely, somewhat likely, not too likely, not at all likely...How likely are you to be personally affected by the effects of global warming?	Transatlantic Trends Survey

Question Number	Question	Source
Q24	And do you think that a rise in the world's temperature caused by the 'greenhouse effect' is...extremely dangerous for you and your family, very dangerous, somewhat dangerous, not very dangerous, or, not at all dangerous for you and your family?	General Social Survey ISSP Module 1993
Q30	I'd like to ask you about priorities for President [Obama/Bush] and Congress this year. As I read from a list, tell me if you think each should be a top priority , important but lower priority, not too important or should it not be done....Dealing with global warming	Pew Research: Center for the People and the Press
Q31	Do you feel that global warming is a very serious problem, a somewhat serious problem, not too serious a problem, or not a serious problem at all?	Cambridge Reports National Omnibus Survey
Q32	I'd like your opinion about some possible international concerns for the US. Do you think that...global climate change is a major threat, a minor threat or not a threat to the well-being of the United States?	Pew Research: Center for the People and the Press
Q33E	(As I read a list of possible long-range foreign policy goals which the United States might have, tell me how much priority you think each should be given.)...Dealing with global climate change...Do you think this should have top priority, some priority, or no priority at all?	Pew Research: Center for the People and the Press
Q34	Do you think global warming is an environmental problem that is causing a serious impact now, or do you think global warming isn't having a serious impact?	CBS News Poll
Q35	Do you think global warming is an environmental problem that is causing a serious impact now, or do you think the impact of global warming won't happen until sometime in the future, or do you think global warming won't have a serious impact at all?	CBS News/New York Times Poll
Q38	Do you think that global warming will pose a threat to you or your way of life in your lifetime?	Gallup/CNN/USA Today Poll
Q39	Do you think that the possibility of global warming should be treated as a very serious problem, a somewhat serious problem, or not a serious problem?	Harris Poll
Q46	How important is the issue of global warming to you personally--extremely important, very important, somewhat important, not too important, or not at all important?	ABC News/Time/Stanford University Poll
Q47	How much do you personally worry about global warming--a great deal, a fair amount, only a little, or not at all?	Pew Global Attitudes Project Poll
Q47A	If nothing is done to reduce global warming in the future, how serious of a problem do you think it will be for the United States--very serious, somewhat serious, not so serious or not serious at all?	ABC News/Time/Stanford University Poll

Question Number	Question	Source
Q47B	If nothing is done to reduce global warming in the future, how serious of a problem do you think it will be for the world--very serious, somewhat serious, not so serious or not serious at all?	ABC News/Time/Stanford University Poll
Q49	I'm going to read you a list of environmental problems. As I read each one, please tell me if you personally worry about this environmental problem a great deal, a fair amount, only a little, or not at all. How much do you personally worry about... the 'greenhouse effect' or global warming?	Gallup Poll
Q5	Here is a card with a scale from 1 to 7, where 1 means no threat at all and 7 means a large threat. Now I am going to read you several potential problems facing our society. As I read each one, please use the card to tell me how much you think each problem threatens your personal health and safety. The more you think a problem threatens your personal health and safety, the higher the number you would give it....The greenhouse effect	Cambridge Reports National Omnibus Survey
Q51	In general, do you think that a rise in the world's temperature caused by the 'greenhouse effect' is...extremely dangerous for the environment, very dangerous, somewhat dangerous, not very dangerous, or, not at all dangerous for the environment?	General Social Survey ISSP Module 1993
Q53	In your view, is global warming a very serious problem, somewhat serious, not too serious, or not a problem?	Pew News Interest Index/Believability Poll
Q58	Scientists use the term 'global warming' to refer to the idea that the world's average temperature may be about five degrees Fahrenheit higher in 75 years than it is now. Overall, would you say that global warming would be good, bad, or neither good nor bad? If Good, ask: Would you say it would be very good or somewhat good? If Bad, ask: Would you say it would be very bad or somewhat bad? If Neither, ask: Do you lean toward thinking it would be good, lean toward thinking it would be bad, or don't you lean either way?	ABC News/Washington Post/Stanford University Poll
Q60	Some people have expressed concern that the greenhouse effect could result in some of the world's most productive agricultural areas becoming too arid for farming. Which of the following views about the greenhouse effect is closest to your own opinion?. 01. Based on the scientific community's current understanding of the greenhouse effect, the federal government should pass environmental laws to help solve the problem. 02. The federal government should pass some initial laws now to begin to curb the greenhouse effect but should avoid costly control programs until more research is done to find out exactly what causes the greenhouse effect and what its impact will be. 03. Before passing any new environmental laws to help curb the greenhouse effect, the federal government should finance more research efforts to find out exactly what causes the greenhouse effect and what its impact will be.	Cambridge Reports National Omnibus Survey
Q63	Do you think global warming is a problem that requires immediate government action, or don't you think it requires immediate government action?	Pew Research: Center for the People and the Press

Question Number	Question	Source
Q64	Thinking about what is said in the news, in your view is the seriousness of global warming--generally exaggerated, generally correct, or is it generally underestimated?	Gallup/CNN/USA Today Poll
Q71	Which of the following statements reflects your view of when the effects of global warming will begin to happen? They have already begun to happen. They will start happening within a few years. They will start happening within your lifetime. They will not happen within your lifetime, but they will affect future generations. They will never happen.	Gallup/CNN/USA Today Poll
Q9	I am going to read you a list of possible threats to the vital interests of the United States in the next 10 years. For each one, please tell me if you see this as a critical threat, an important but not critical threat, or not an important threat at all.... Global warming	CCFR Survey of American Public Opinion and U.S. Foreign Policy
Q99	Six Americas Poll - % Concerned or Alarmed	Yale University
Q999	(I am going to read you a list of possible international threats to the United States in the next 10 years. Please tell me if you think each one on the list is an extremely important threat, an important threat, or not an important threat at all.)...The effects of global warming	Transatlantic Trends Survey
QYM1	How worried are you about global warming?	Yale and George Mason
QYM2	How much do you think global warming will harm you personally?	Yale and George Mason

Table S-4: CCTI Convergence Table

Iteration	Convergence	Criterion	Items	Reliability	AlphaF	AlphaB
1	0.5211	0.001	35	0.807	1	0.5
12	0.0872	0.001	35	0.701	1	0.5
13	0.0191	0.001	35	0.7	1	0.5
14	0.0087	0.001	35	0.706	1	0.5
15	0.0081	0.001	35	0.711	1	0.5
16	0.0073	0.001	35	0.716	1	0.5
17	0.0063	0.001	35	0.72	1	0.5
18	0.0052	0.001	35	0.723	1	0.5
19	0.0041	0.001	35	0.725	1	0.5
10	0.0031	0.001	35	0.727	1	0.5
11	0.0022	0.001	35	0.728	1	0.5
12	0.0016	0.001	35	0.729	1	0.5
13	0.0011	0.001	35	0.73	1	0.5
14	0.0007	0.001	35	0.73	1	0.5

Table S-5: CCTI Loadings and descriptive variable information

Variable N	Variable	Cases	Dimension 1 Loading	Dimension 2 Loading	Mean	Std Deviation
2	Q12	18	0.893	0	32.304	4.363
130	Q71	16	0.942	0	53.938	3.766
16	Q38	10	0.844	0	34.249	4.118
127	Q60	8	0.93	0	17.5	6.708
125	Q53	8	0.797	0	39.513	4.256
15	Q35	9	0.621	0	42.593	6.996
132	Q99	5	0.962	0	43.216	4.003
134	QYM1	5	0.848	0	54.913	4.409
123	Q5	4	0.924	0	35.75	10.207
4	Q15	4	0.873	0	40.75	10.425
18	Q46	7	0.497	0	42.143	9.657
131	Q9	6	0.574	0	40.167	4.981
13	Q33E	5	0.665	0	38.4	5.2
120	Q47A	6	0.532	0	49.415	7.509
121	Q47B	6	0.51	0	55.75	5.031
3	Q13	3	1	0	37.667	3.399
122	Q49	3	0.997	0	29.667	4.497
14	Q34	3	0.996	0	65.164	4.588
124	Q51	3	0.956	0	39.333	3.091
8	Q2	3	0.918	0	67	2.449
6	Q17AB	3	0.788	0	33	0.816
11	Q31	3	0.709	0	41	3.559
1	Q11	2	1	0	36.5	2.5
9	Q24	2	1	0	36	3
126	Q58	2	1	0	39	1
133	Q999	2	1	0	42.5	3.5
7	Q18	5	0.34	0	36.4	6.741
129	Q64	16	0.105	0	51.563	12.669
128	Q63	3	0.364	0	63	3.742
135	QYM2	5	-0.008	0	34.226	3.544
12	Q32	3	-0.526	0	45.667	1.7
17	Q39	2	1-1.000	0	46.5	0.5
19	Q47	2	1-1.000	0	52	1
5	Q16	3	-0.883	0	40.667	2.055
10	Q30	8	-0.572	0	29.875	4.166

Dimension 1 Information

Eigen Estimate 3.72 of possible 6.43

Pct Variance Explained: 57.79

Weighted Average Metric: Mean: 42.00 St. Dev: 13.99

Table S-6 Major Oil Spills in the U.S. 1986-2015

Major Oil Spills (over 10,000 tons)	Year
Ashland oil spill	1988
Exxon Valdez	1989
Mega Borg	1990
Bass Enterprises Oil Spill (Hurricane Katrina)	2005
Deepwater Horizon	2010

Table S-7 Major Scientific Reports on Climate Change 1986-2015

1990	IPCC 1 st Assessment Report
1995	IPCC 2 nd Assessment Report
2000	1 st U.S. National Assessment Report
2001	IPCC 3 rd Assessment Report
2007	IPCC 4 th Assessment Report
2009	2 nd U.S. National Assessment Report
2013	IPCC 5 th Assessment Report
2014	3 rd U.S. National Assessment Report

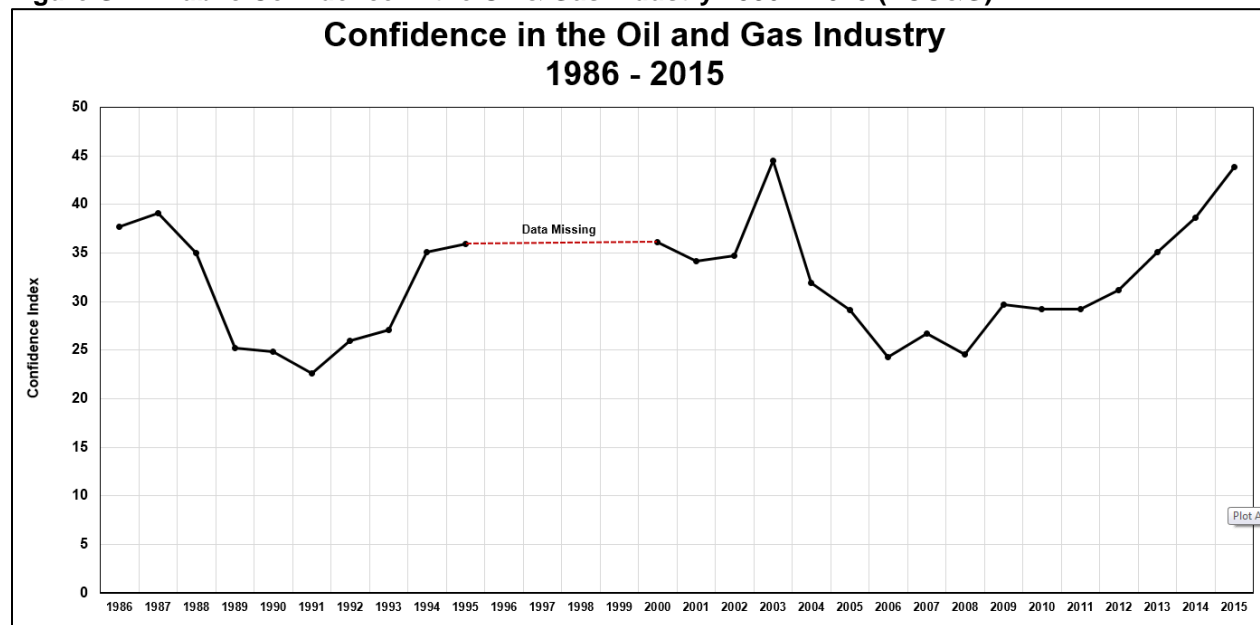
Figure S-2: Public Confidence in the Oil & Gas Industry 1986 – 2015 (PCO&G)

Table S-8: Confidence in the Oil & Gas Industry 1986 – 2015

Year	Confidence Index	Year	Confidence Index	Year	Confidence Index
1986	37.689	1996		2006	24.318
1987	39.124	1997		2007	26.723
1988	34.979	1998		2008	24.595
1989	25.191	1999		2009	29.65
1990	24.819	2000	36.074	2010	29.236
1991	22.622	2001	34.128	2011	29.192
1992	25.964	2002	34.717	2012	31.138
1993	27.053	2003	44.55	2013	35.099
1994	35.067	2004	31.953	2014	38.613
1995	35.959	2005	29.168	2015	43.878

Table S-9: CCTI Questions

Question Number	Question	Source
Q1	On another subject, for each of the following business sectors in the United States, please say whether your overall view of it is very positive, somewhat positive, neutral, somewhat negative, or very negative. How about - oil and gas industry	Gallup
Q2	Do you have a generally favorable opinion of oil companies? Very favorable, Somewhat Favorable, Somewhat Unfavorable, or Very Unfavorable.	Kaiser Health Tracking Poll
Q3	What is your opinion of oil companies? Very favorable, Somewhat Favorable, Somewhat Unfavorable, or Very Unfavorable	Pew Research Center
Q4	What is your opinion of oil companies? Very favorable, Somewhat Favorable, Somewhat Unfavorable, or Very Unfavorable	Cambridge Omnibus

Table S-10: Oil & Gas Confidence Convergence Table

Iteration	Convergence	Criterion	Items	Reliability	AlphaF	AlphaB
1	0.4968	0.001	4	0.932	0.907	0.877
2	0.0009	0.001	4	0.931	0.906	0.872

Table S-11: CCTI Loadings and descriptive variable information

Variable N	Variable	Cases	Dimension 1 Loading	Dimension 2 Loading	Mean	Std Deviation
1	Q1	15	0.994	0	23.067	5.744
4	Q4	10	0.996	0	50.5	7.593
2	Q2	4	0.802	0	29.5	2.291
3	Q3	2	1	0	26	6

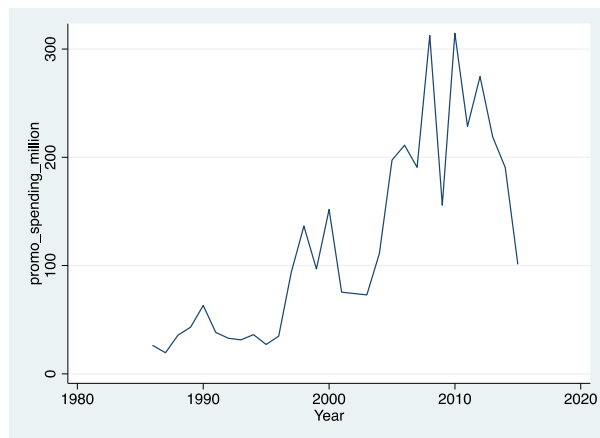
Table S-12 Regression Analysis Data

Year	Oil Company Corporate Promotional Spending	CCTI	Climate Change Legislation #Bills/Laws	Climate Change Hearings	Television Coverage of CC	NYT Coverage of CC	Release of Major CC Report (IPCC or NRC)	Public Confidence in the oil and gas industry	# of Major Oil Spills by Oil Companies	GDP (Billions)
1986	\$26,181,360	43.77	7	1	1	40	0	37.689	0	4579.6
1987	\$19,537,320	41.28	15	8	1	45	0	39.124	0	4855.2
1988	\$35,812,000	48.74	12	10	4	126	0	34.979	1	5236.4
1989	\$43,139,260	49.34	85	34	12	213	0	25.191	1	5641.6
1990	\$63,127,370	42.76	51	15	27	228	1	24.819	1	5963.1
1991	\$38,309,580	44.40	56	22	8	164	0	22.622	0	6158.1
1992	\$32,909,370	44.56	30	15	33	217	0	25.964	0	6520.3
1993	\$31,386,320	43.82	17	17	3	84	0	27.053	0	6858.6
1994	\$36,257,600	39.92	15	12	3	64	0	35.067	0	7287.2
1995	\$27,145,879	37.44	18	7	6	89	1	35.959	0	7639.7
1996	\$34,828,097	36.20	12	5	10	86	0		0	8073.1
1997	\$93,723,634	33.69	21	12	67	236	0		0	8577.6
1998	\$136,459,593	35.26	12	23	32	155	0		0	9062.8
1999	\$96,823,755	40.27	48	11	19	157	0		0	9630.7
2000	\$151,775,103	46.62	44	11	37	249	1	36.074	0	10252.3
2001	\$75,396,252	42.21	54	11	51	362	1	34.128	0	10581.8
2002	\$74,194,335	40.67	13	7	26	324	0	34.717	0	10936.4
2003	\$72,949,485	38.83	33	6	13	276	0	44.55	0	11458.2
2004	\$111,132,622	37.36	18	1	27	262	0	31.953	0	12213.7
2005	\$197,408,252	40.54	42	7	42	329	0	29.168	1	13036.6
2006	\$211,157,344	44.73	37	13	81	581	0	24.318	0	13814.6
2007	\$190,764,914	48.60	169	99	227	1014	1	26.723	0	14451.9
2008	\$312,516,850	47.59	131	58	72	672	0	24.595	0	14712.8
2009	\$155,742,652	46.76	252	85	99	668	1	29.65	0	14448.9
2010	\$314,615,978	40.28	113	22	37	435	0	29.236	1	14992.1
2011	\$228,545,100	38.19	142	25	15	367	0	29.192	0	15542.6
2012	\$274,628,173	40.47	55	17	33	378	0	31.138	0	16197.0
2013	\$218,770,600	41.26	138	21	42	415	1	35.099	0	16784.9
2014	\$190,668,869	42.48	89	32	16	596	1	38.613	0	17521.7
2015	\$101,470,600	42.08	191	37	22	676	0	43.878	0	18219.3

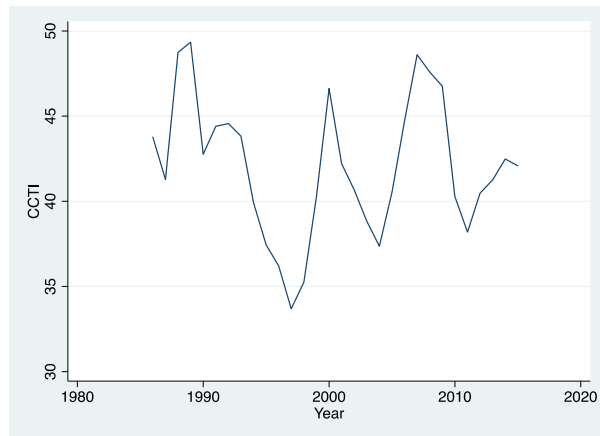
Table S-13 Contemporaneous Bivariate Correlation Matrix (all variables first-differenced)

	1	2	3	4	5	6	7	8	9
1. Big Oil PR Expenditures	1								
2. Elite Cues	-0.4755	1							
3. # of CC Hearings and Legislation	-0.663	0.7918	1						
4. CC Media Coverage	-0.3401	0.9669	0.6097	1					
5. Oil Spill Volume	-0.0348	0.1583	0.1069	0.1608	1				
6. 1 = Release of Major Climate Report	-0.2927	0.5225	0.4343	0.4966	0.3249	1			
7. CCTI	-0.0336	0.3974	0.329	0.3782	0.1187	0.1611	1		
8. Petro Comp Reputaional Index	-0.1105	0.1551	0.1873	0.1231	0.2378	0.3092	0.0453	1	
9. GDP	0.3404	0.218	-0.1005	0.3249	0.01	-0.0564	0.3087	0.1239	1

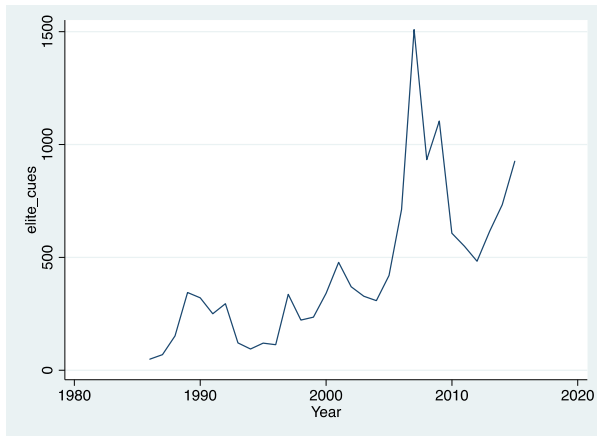
Figure S-3: Trends for Key Variables



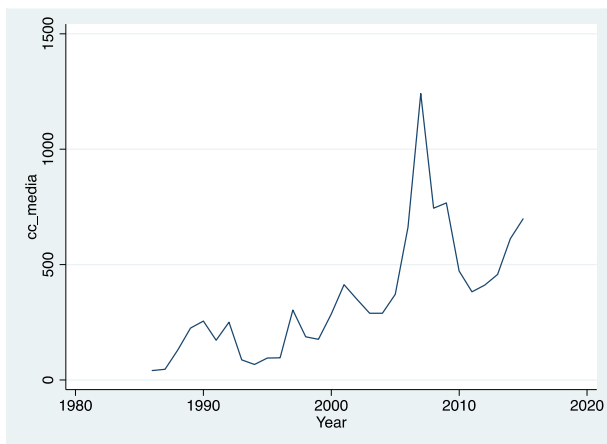
Promotional Spending by Year (Millions of \$s)



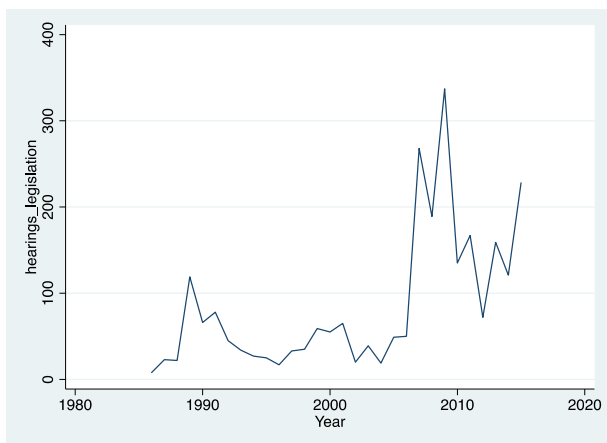
CCTI by Year



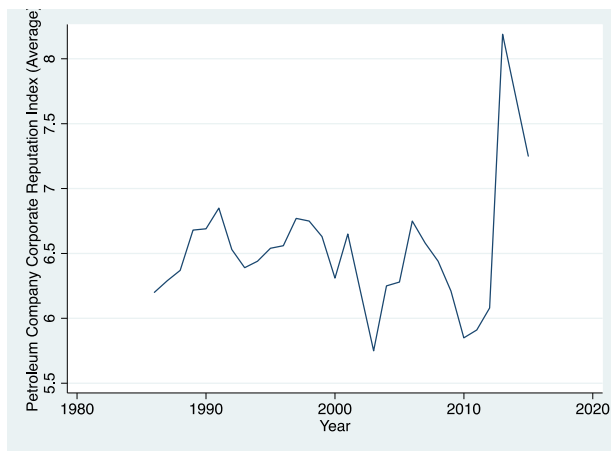
Elite Cues by Year



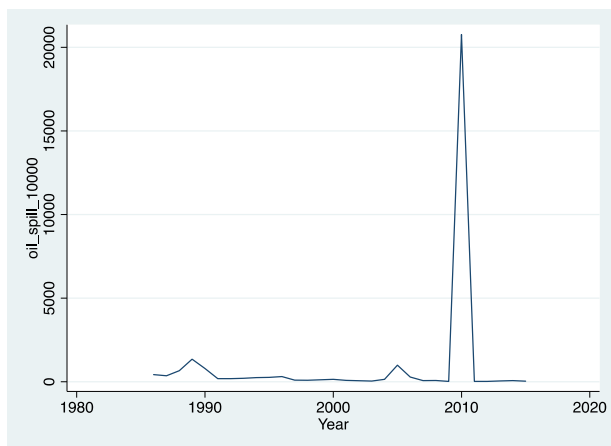
Media Coverage of Climate Change by Year



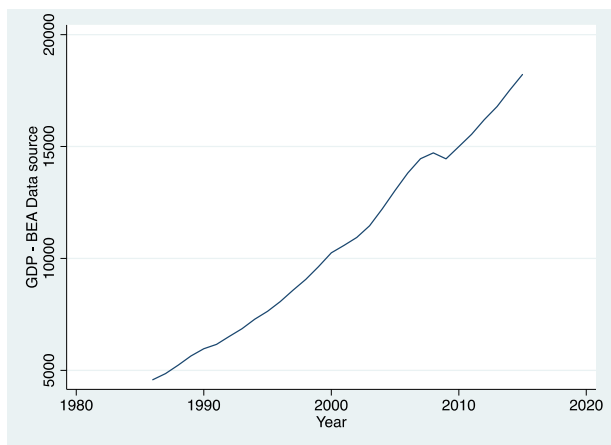
Political Attention on CC by Year



Petro Corp Reputational Index by Year



Oil Spills Volume by Year (/10,000)



Gross Domestic Product (GDP) by Year

